

Serial No. 09/923,477

PATENT  
Docket No. 58027-010400REMARKS

Responsive to the Final Office Action of May 21, 2003, reconsideration of the above application is respectfully requested.

Independent claims 1, 22, and 23 were rejected under 35 U. S. C 102(b) as being anticipated by Batchelder (US. 4,390,403). Specifically, the Examiner contends that the '403 patent teaches the principles of mixing of two sample fluids by means of a time-varying electrical field.

Respectfully, the Applicants' disagrees with the Examiner. The '403 patent teaches an apparatus and a method for: (i) controlling the movement of a single fluid by means of an electric field (FIGs. 1, 2 4, 5), and (ii) the fissioning (i.e., separation) of a higher dielectric material from a bulk material using a dielectrophoretic process (FIG. 3). Accordingly, FIG. 6A, which the Examiner has cited in rejecting the independent claims, teaches (i) and (ii) only.

Just because materials from reservoirs 84, 80, and 82 are transported to the "mix and detect" tank 86, does not imply that there is a specific mixing process in the "mix and detect" tank 86.

Furthermore, nowhere is the aspect of homogenous mixing between two sample materials, using time varying electric fields, disclosed, taught, or suggested in the '403 reference. The time-varying electrical field applied between the electrodes, in the '403 reference, to induce dielectrophoretic forces was shown by the Applicants' (MEMS 2001 reference cited in paragraph [0050] of the present application) to be insufficient to induce mixing. In fact, the time-varying electrical field in the '403 reference can lead to the inverse of mixing (viz., separation) as shown by FIG. 3 of the '403 reference.

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In contrast, the present invention teaches a mixer device and a method for achieving **homogenous mixing** of two sample fluids using either time varying electric fields, time varying pressure fields, etc.

Furthermore, the materials in the '403 reference have a **linear flow** in the vicinity of the electrodes which are positioned **outside** the channel (e.g., FIGs. 1-3 of the present invention). In contrast, in the present system, the flow of the sample materials is highly **perturbed** and **substantially nonlinear or chaotic** in the vicinity of the electrodes (as shown by the folding and stretching of the interface between the samples in FIG. 3 of the present invention). This perturbation in the flow of the sample materials is due to the application of modulated signals to the electrodes, as claimed for example in dependent claim 6, which are positioned **inside** the micro mixer channel.

Dependent claim 20 has been rejected under 35 U. S. C. 103(a) as being unpatentable over Batchelder in view of Nordman (US. 6,176,991). Specifically, the Examiner contends that the Nordman's channel, utilizing electrophoresis, may be configured as an open channel (col. 4, lines 1-9).

Respectfully, the Applicants' disagree with the Examiner. It is clear that the open channel configuration will not function for electrophoresis in Nordman. This is due to the fact that an additional electro-wetting effect (or voltage-controlled surface tension), rather than electrophoresis, will be dominant on the open side of the sample liquid. It is **required** that the channel, in Nordman, be closed to induce electrophoresis and prevent electro-wetting effects (or voltage-controlled surface tension).

New claims 24 and 25 further distinguish the present invention from the Examiner cited prior art.

Accordingly, it is requested that the rejections applied to all claims be traversed.

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Thus, in view of the above, it is submitted that this application is now in good order for allowance, and such early action is respectfully solicited. Should matters remain which the Examiner believes could be resolved in a telephone interview, the Examiner is requested to telephone the Applicants' undersigned attorney.

Respectfully submitted.

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